essential to teach a student that *acceleration* is the inevitable property of *every* force. The motion in Atwood's machine is calculated first by the strictly valid method of introducing the tension, and then by the old method of "mass moved $=W_1+W_2$; accelerating force $=W_1-W_2$, &c.," which latter should either be unmentioned, or, if mentioned, justified (if possible). The formal statement "when a force acts upon a body and causes motion, it is said to do work" (p. 48) is very dangerous doctrine. The tension of an inextensible pendulum cord certainly does no work, though it exists in the motion. Are we to suppose that safety is contained in the word "causes"? If so, the metaphysician must be heard. On the important and almost universal fallacy concerning "centrifugal force" the author is a clear and safe guide.

A large collection of the ordinary statical problems is followed by a discussion of centres of gravity, moments of inertia and rotatory motions of rigid bodies, and a chapter on graphic statics, the whole being illustrated by a large collection of very well chosen examples. M.

INDUCED RADIO-ACTIVITY.

Radium and Other Radio-active Substances; their Application especially to Medicine. By Dr. Charles Baskerville. Pp. 164. (Philadelphia: Williams, Brown, and Earle, n.d.)

PROF. BASKERVILLE'S book is disappointing. On opening a work on a scientific subject by an original worker in the field of which it treats one expects to find the original materials thoroughly digested and worked up, and the relative merits of rival theories and conflicting experimental data carefully weighed; one hopes, too, to find novel suggestions for the interpretation of existing data, and hints to guide experimental research in the future.

In the present work these things are not to be found. It may be said, broadly, that the book is no more than a collection of abstracts of original papers, put together, indeed, in some approach to a consecutive order, as regards subject-matter, but without the attempt to weld them into a homogeneous whole. We constantly find, for instance, that views which have no serious claims to attention, either from the authority of their authors or from the arguments they put forward, are treated with quite as much respect as the opposite conclusions of leading workers in the subject, which are supported by strong experimental evidence.

In some cases the author even goes so far as apparently to endorse conclusions which are opposed to his own. On p. 88 we have a picture, underneath which the following explanation is given:—

"This is a radiograph of a gold fish which had been placed in water rendered radio-active by having suspended in it for 24 hours a *closed tube* (our italics) containing ten milligrams of radium of high activity. By this process the water was rendered radio-active, and the fish was then placed in the water, and, although the radium had been entirely removed, the fish itself was rendered radio-active, and, when placed on a photographic plate, photographed itself by its own radio-activity."

As Prof. Baskerville, contrary to his usual custom, mentions no name in connection with this experiment, we assume that it is his own. None the less, we read, on pp. 92–93:—

"Piffard calls attention to the fact that no authoritative statement has been given as to the rendering of water or other substances radio-active by the presence of a closed tube of radium. He further detected defects in tubes, air bubbles, &c., and regards the statements concerning induced activity by means of closed tubes as based upon the use of defective tubes. As Curie and Rutherford have shown, induced activity requires a naked exposure to radio-active bodies."

For our own part, we have no belief in radio-activity having been produced in the fish under the conditions described. The photographic effects may have been due to imperfect closing of the tube of radium, or they may have been produced by some direct chemical effect of the fish's skin on the film. But however that may be, the author's attitude in emphasising equally two opposite statements is not intelligible. Prof. Baskerville has shown great industry in bringing together the results of different experimenters, but we cannot think that he has presented his collection judiciously.

GARDEN CITIES.

Garden Cities in Theory and Practice. By A. R. Sennett. Vol. i., pp. xix+557. Vol. ii., pp. xii+558. (London: Bemrose and Sons, Ltd., 1904.) Price 21*s.* net.

THESE two handsome volumes represent the amplification of a paper on "The Possibilities of Applied Science in a Garden City" which was read by Mr. A. R. Sennett before Section F of the British Association in 1903.

The author first deals very fully with the engineering problem involved in the laying out of garden cities. A comparison of the various plans on which the great cities of the world have been built is given in a most lucid and interesting manner, after which the author shows with many clear and convincing arguments that the best type is that known as the rectilinear configuration, which is the one he adopts—the worst of all being the curvilinear type, not only from an æsthetic, but also from a practical point of view.

An interesting account of the rebuilding of London after the great fire is given in chapter ii. The various plans, especially those of Sir Christopher Wren and Sir John Evelyn, are fully discussed. The plan of the former was more or less adopted, although all his proposals were unfortunately not adhered to, with the result that many fine architectural effects are lost to the metropolis. We cannot do better than recommend those who are interested in this important subject to read the author's own account, which should excite interest even in the apathetic. In regard to the spacing out of the area for his proposed garden city, the author has carefully considered every

detail. The proportion of the area to be occupied by the public thoroughfares, promenades, avenues, and private gardens is fully discussed. By a most ingenious and original plan of allotment, each house in the city stands in its own ground without being unduly overlooked or interfered with by neighbouring dwellings, but at the same time fitting harmoniously into the whole. Instead of the usual oblong or rectangular arrangement, the author subdivides the ground into polygonal or, more precisely, hexagonal plots. This he shows preserves a uniform frontage length, and at the same time admits of great elasticity as regards the size of the allotments which different inhabitants may desire.

The city proposed by the author would consist of three separate areas, viz. the city proper, the village with its industrial zone, and the agricultural fringe. Each department is so arranged and laid out that the maximum amount of comfort and utility is combined with the minimum amount of expense. The city as a whole is so designed that it shall be self-supporting. All needless expense and extravagance are scrupulously avoided. The artisan's dwelling is made for the artisan, and the same applies to the housing of every grade and class of society. All are suitably provided for. Public buildings and offices, railway stations, &c., are grouped together within easy access of each other in the centre of the city.

The sanitary and hygienic conditions of every kind are treated in an able and scientific manner. Every health-promoting device that ingenuity can suggest is brought forward in its proper place. It is beyond the scope of a review to mention these in detail. Suffice it to say that nothing is suggested which cannot be easily put into practice; and, further, many of the author's valuable and common-sense suggestions might with great advantage be adopted in our present cities.

The sociological aspect of garden cities is treated in a rational and scientific manner. The doctrine of "equality" which was urged by some when the site of the first garden city was acquired is relegated to its proper place by the author, who reminds his readers that the outcry for equality has proved the curse of industrial England, and points out the absurdity of ranking the "loungers—the quasi-inert and industrially passive atoms—as of equal national value to the active workers or energy-imparting unit." The decentralisation of industry is one of the great objects of garden cities—hence the authorities can deal with nothing below the industrial unit.

Under the heading "Charity" the problem of dealing with the poor and infirm is discussed. The various pitfalls and dangers attendant upon indiscriminate charity are shown by actual examples. The problem is a serious one; but in this, as in other cases, the author finds a way of overcoming the difficulty, especially as regards garden cities which are untrammelled by established practice or tradition, and where methods such as the Elberfeld system, so successfully adopted in the town of that name and in Leipzig, and which the test of time—half a century—has proved to be sound in principle, might quite easily be put into practice.

The work contains a wonderful amount of valuable information written in a readable style, while the illustrations are numerous, well chosen, and admirably reproduced.

OUR BOOK SHELF.

Elementary Experimental Chemistry. By A. E. Dunstan. Pp. viii+173. (London: Methuen and Co., 1905.) Price 2*s*.

So many books on elementary chemistry have been published within the last few years that it is rather difficult to imagine why any more should be written, unless there is something strikingly novel in the style or matter of the book. For anything novel we search in vain in the little book before us.

After being introduced to the metric system, in chapter ii. the student is supposed to find out the difference between chemical and physical changes by having to note the effect of heat upon sulphur, lead, magnesium, and sugar, and at the end of each experiment he has to state whether the change is physical or chemical. Chapter iii. deals with air, chapter iv. with active air. In chapter x. we come to solution, which to our mind would have been better treated earlier.

Formulæ are not mentioned until p. 130, and on p. 131 the union of atoms to form molecules is shown in a diagrammatic manner which we venture to think will leave the student very little wiser than before. Almost all through the book the equations are written in words and not expressed in symbols, as, for example, zinc+sulphuric acid=zinc sulphate+hydrogen. This is not necessarily objectionable in an elementary book, but to formulate all the equations which occur in the course of the book in an appendix is simply wasting type, because the student will never look at them. Furthermore, will the student understand the action of nitric acid upon copper by writing the equation in this manner?

$$2HNO_3 \left\{ \begin{matrix} 2\,N\,O \\ H_2O \\ 3\,O \end{matrix} \right. + 3Cu = \left\{ \begin{matrix} \\ 2NO + H_2O + 3CuO. \\ \\ \end{matrix} \right.$$

It is then explained that the copper oxide is acted upon by a further quantity of nitric acid, &c.

Some of the experiments which the student is supposed to carry out are more for the lecture table than for the laboratory. For instance, on p. 121 the student has "to find the proportions in which oxygen and hydrogen combine to form water." Dry hydrogen and oxygen have to be collected in a eudiometer *over mercury* and then sparked. On p. 122 a similar experiment has to be carried out, but in this case to show the volume of steam formed. These are not experiments for elementary students, and we doubt whether the author himself allows his students to carry them out.

The book is very fully illustrated, and some of the exercises are undoubtedly good, but for the book to be really useful to the student will require a considerable amount of discrimination on the part of the teacher as to what experiments the student can himself be trusted to work out.

Wayside and Woodland Blossoms. By Edward Step; with coloured pictures by Mabel Step. First series, pp. xiii+176+127 plates. Second series, pp. xv+171+127 plates. (London: Frederick Warne and Co., 1905.) Price, each volume, 6*s*. net.

ABOUT ten years ago Mr. Step prepared two handy little volumes which many country ramblers have